

SUPPLEMENTARY NOTES ON THE AMERICAN SPECIES
OF STRYCHNOS. XIX.

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Since the latest paper of this series was published 116 new collections were examined. The newly examined collections added to our knowledge of several species and extensions of range noted for 15. It is most satisfying that we received specimens from 5 previously unexplored or poorly explored regions of South America, namely Apuré (Venezuela), Chocó (Colombia), Madre de Dios (Peru), also Ecuador and Bolivia. The Department of Apuré yielded a new species, S. davidsei, four extensions of ranges, and series of sterile specimens, related to S. erichsonii, which may be a new species. Of considerable interest is the second and third collection of S. schunkei, a new record from Ecuador and the first collection in fruit. An extension of range of S. pachycarpa to Choco previously known from four collections from Amazonas (Brazil) not too far from Manaus and one from Surinam is of interest.

3. Strychnos colombiensis Krukoff & Barneby, Mem. N.Y. Bot. Gard. 12 (1): 21. 1965.

Colombia: Choco: Hoya del Rio San Juan, E. Forero 4038, 4564, 4793; Vaupés: Rio Piraparana, R. E. Schultes 17059 (GH) (28/8-52-flrs).

This is the first record of the species from Vaupés.

5. Strychnos romeu-belenii Krukoff & Barneby, Mem. N.Y. Bot. Gard. 20 (1): 22. 1969.

Brazil: Bahia: munic. Itiruçu, T. S. dos Santos 3444.

Two samples, one consisting of 7 ounces of inner root bark and another of two ounces of outer root bark were sent to Prof. Marini-Bettolo.

From the root bark of this species (Romeo Belem 3504 from Bahia, Brazil) 11-methoxydiaboline was isolated. Previously it was isolated from the stem bark of the same species (3: 296).

For the previous information on the alkaloids in S. romeu-belenii see Lloydia 35: 215, 1972 and Phytologia 25: 49. 1972.

6. Strychnos rondeletioides Spruce ex Bentham, Jour. Linn. Soc. 1: 104. 1856.

Venezuela: Terr. Fed Amazonas, ca 20 kms S of confluence of rio Negro and Cassiquiare, R. L. Liesner 7331. Brazil: Amazonas: O. C. Nascimento 833 (MG) (Rio Miual), O. P. Monteiro 1395 (INPA) (Rio Canuma). C. A. Cid 103 (INPA) and 499 (INPA) (Rio Uatumá). Colombia: Vaupes: Mitú, James L. Zarucchi 1823, 2453.

This is the first record of the species from Terr. Fed. Amazonas.

Gentry 18530 is correctly labelled on sheets but through typographical error cited as S. erichsonii in 11th supplement (Phytologia 41: 237. 1979).

- 12 Strychnos panamensis Seemann, Bot. Voy. Herald 166. 1854.

Mexico: Jalisco: vicin. Jirosto, H. H. Iltis 1470. Panama: Isla Bayano, Christina Garibaldi 234 (MO). Colombia: Chocó: E. Forero 1614 (MO) and 1889 (mun. Riosucio), 1991 (mun. Acandi), 2531 (MO) and 2659 (mun. Quibdo), 2703 (MO) and 2708 (Yuto-Lloro), 4458 and 4640 (Hoya del Rio San Juan).

These are the first records of the species from Jalisco.

13. Strychnos tabascana Sprague & Sandwith, Kew Bull. 1927: 128. 1927.

Mexico: Veracruz, San Andres Tuxtla, R. Cedillo T. 205 (MO).

14. Strychnos divaricans Ducke, Bull. Mus. Hist. Nat. Paris II. 4: 746, 1932.

Brazil: Bahia: Maricas, S. A. Mori et al 11177.

This is the first record of the species from Bahia.

15. Strychnos bahiensis Krukoff & Barneby, Mem. N.Y. Bot. Gard. 20 (1): 29. 1969.

Brazil: Bahia: mun. Santa Cruz de Cabralia, S. A. Mori 11654.

- 19 Strychnos toxifera Robert Schomburgk ex Bentham, Jour. Bot. Hook. 3: 240. 1841.

Colombia: Chocó: E. Forero 1629, 1666, and 1810 (mun. Riosucio), 2702 (MO) (Yuto-Lloro), Ecuador: Los Ríos or Pichincha, C. H. Dodson 8419 (MO).

This is the first record of the species from Los Ríos.

20. *Strychnos tomentosa* Bentham, Jour. Linn. Soc. 1: 104. 1856.

French Guiana: Grenand 437.

In connection with the transfer of four sterile specimens, previously identified as of *S. tomentosa* to the newly described *S. davidsei* it appears that the former species has been collected in the three Guainas and the Amazonian Brazil (Terr. of Amapá, Pará, Roraima, Amazonas, and Maranhão). It was not collected in Venezuela.

- 20a. *Strychnos davidsei* Krukoff & Barneby sp. nov.

Ad sectionum *Strychnos* referenda *S. tomentosae* affinis, sed corollae tubo gracili 5-6.5 (nec 11--20) mm longo intus ad orem corona omnino destituto baccaeque maxima 12-13 cm usque diam pericarpio lignoso tenuiori \pm 1.5 (nec 2-3) mm crasso diversa.

Macroscopic: Young blades, elliptic, obtuse to rounded at base, acute to acuminate at apex, membranaceous, 3 (5) - pli-nerved, with the inner pair opposite or alternate, the secondaries impressed above and prominent beneath, reticulation faint on both surfaces.

Microscopic: Petioles densely fulvous-pubescent and so are the blades especially on principal nerves and secondaries.

Inflorescences terminal to lateral branchlets, densely cymose-globose at anthesis 2-3 cm diam, the peduncle \pm 3-6 mm, the pedicels 0.3-1.3 mm, the bracts and bracteoles minute caducous; calyx and corolla externally densely pilosulous with spreading-ascending straightish hairs 0.4--0.7 mm; calyx 1.3-2 mm, the narrowly subulate lobes 1--1.6 X 0.2-0.3 mm; tube of corolla 5--6.5 mm long, at middle 0.5--0.6 mm diam, internally glabrous near base, thence thinly pilosulous up to the unappendaged orifice; lobes of corolla narrowly triangular, internally densely papillose beardless; anthers sessiloid at the sinuses elliptic-oblong 0.8--0.9 X 0.5' mm glabrous, the connective muticous; pistil glabrous, the stigma exserted \pm 1 mm from orifice of corolla.

Mature fruits globose, very large, 12-13 cm in diam, shell thin, hard but fragile, \pm 1.5 mm thick, testa crustaceous; seeds many, more or less discoid, about 27 mm long and 20 mm broad.

The plant is a bush-rope with tendrils. The species is distinguished from the related *S. tomentosa* as shown in the diagnosis. In addition, their ranges are probably different. See under *S. tomentosa*.

Venezuela; Apuré: district Pedro Camejo. Gerrit Davidsen & Angel C. Gonzalez 14347 (Holotype-NY, MO) (ca 3 km E of Mata de Guanabano along the bank of Rio Meta, riverbank with gallery forest) (not fully mature leaves, mature flowers & fruits - Feb. 20, 1978) 15885 (ox - bow lake, ca. 1 km SE of Yaruro, + 50 m, dry deciduous forest surrounding the inundated gallery forest) (not fully mature leaves, mature flowers, and fruits - Feb. 28, 1978); district Rómulo Gallegos, caño Caribe, + 90 m, deciduous gallery forest on high bank - 16196 (not fully mature leaves, and mature flowers).

In addition to the flowering specimens on which the description is based, the following sterile ones, previously cited as S. tomentosa, probably belongs here: Venezuela: Distrito Federal: 1300-1500 m, Steyermark & Farinas 97583 (NY, VEN); Lara: R. F. Smith V 7415 (VEN); Sucre: Rio Grande, Victor Carreno Espinosa s/n (30/6-1973) (VEN). Aragua: La Misa, Parque Nacional, Pittier & Nakichenovich 15680 (VEN, US), A. H. G. Alston 5280 (BM, TEX).

Of Steyermark & Farinas 97583 three sheets with immature and mature leaves are available. Immature leaves of this collection are a perfect match those of the type collection; the mature leaves are described below:

Macroscopic: Petioles 2-4 mm long, blades elliptic 3-12 cm long, 1.5-4.5 cm broad, obtuse at base, acuminate at apex, chartaceous, 3 (5)- plinerved, with the inner pair opposited on alternate and diverging at 3-10 mm from base, at maturity impressed above, the secondaries impressed above and prominent beneath, reticulation faint on both surfaces.

Microscopic: Petioles densely fulvous pubescent becoming less densely in age; blades beneath becoming nearly glabrous except for nerves below and above, tubercles usually absent on both surfaces.

24. Strychnos jobertiana Baillon, Adansonia. 12: 367. 1879.

Peru: Loreto: Maynas, A. Gentry 22191.

From the bark of roots of this species collected near Manaus, Amazonas, Brazil (Prance 3943) tertiary alkaloids diaboline and akagerine were isolated together with quaternary alkaloids which are still under examination (private communication from Marini-Bettolo).

For the previous information on the alkaloids in S. jobertiana see Lloydia 35: 226. 1972.

25. Strychnos pseudo-quina A. St. Hilaire, Mem. Mus. Paris 9: 340. 1822.

Brazil: Mato Grosso: Cuiaba-Santarem, M. G. Silva 4481 (MG).

26. *Strychnos xinguensis* Krukoff, Brittonia 4: 283. 1942.

Brazil: Para: Sao Felix do Xingu, Carlos S. Rosario 60.

28. *Strychnos solimoesana* Krukoff, Brittonia 4: 280. 1942.

From the root bark of two samples of this species (Prance 21254 and 13929, from Rio Purus, Amazonas, Brazil) diaboline was isolated. From the later samples two dimeric alkaloids - C - calebassine (0.5%) and C - curarine (0.1%) were also isolated (3: 296).

The above chemical assay confirm our identifications of sterile specimens from the basin of Rio Purus as of this species, rather than of the unrelated *S. recognita*.

For the previous information on the alkaloids in *S. solimoesana* see Lloydia 35: 228. 1972.

31. *Strychnos peckii* B. L. Robinson, Proc. Amer. Acad. 49: 504. 1913.

Venezuela: Miranda: Cerros del Bachiller, J. A. Steyermark 116562, 116804. Brazil: Amazonas: mun. Itapiranga, C. A. Cid 777 (INPA).

32. *Strychnos erichsonii* Richard Schomburgk, Reisen 3: 1082 1848, nomen ex Progel in Mart. Fl. Bras. 6 (1): 274. 1868.

Peru: Loreto: Maynas, C. Dias 214.

M. R. Cordeiro 1122 from Fazenda Cachimbo, Mato Grosso was cited as *S. parviflora* in Suppl. #18 (Phytologia 44: 5, 1979). It is not known whether this is an error in labelling the collections or two different collections are cited by the collector under the same number.

E. Forero 3922, 4134, 4485, 4818, 4828, and 5027 from Hoya del Rio San Juan, also 3924 (locality not given), and A. Gentry 23838 (Quibdo-Istmina) were annotated provisionally as *S. cf. erichsonii*. A new collection in flower is needed to ascertain whether it is a new species or specimens belong to *S. erichsonii*.

From the root bark of this species (Prance 18651, from Rio Aripuana, Mato Grosso, Brazil) diaboline was isolated (3: 296).

For the previous information on the alkaloids in *S. erichsonii* see Lloydia 35: 230. 1972.

- 32a. *Strychnos croatii* Krukoff & Barneby, Phytologia 33: 313. 1976.

E. Forero 2660, Cuatrecasas 17531 (F) was identified in Suppl. #10 as S. erichsonii. It is probably S. croatii.

33. Strychnos gardneri A. DeCandolle in DeCandolle Prodr. 9: 14. 1845.

From the bark of roots of this species collected in Rio de Janeiro (Grajau), Brazil (Luz Emiglio de Mello Filho s.n.) one quaternary alkaloid - N hexane and two tertiary alkaloids, 11-methoxydiaboline,, which is found in bark of many species of Strychnos, and surprisingly akagerine, previously isolated only from African species, were isolated (private communication from Marini-Bettolo)

For the previous information on the alkaloids in S. gardneri see Lloydia 35: 231. 1972.

35. Strychnos bredemeyeri (Schultes) Sprague & Sandwith, Kew Bull. 1927: 128. 1927.

Venezuela: Apuré: Gerrit Davidse 13962 and 14435 (distr. Pedro Camejo), 14744, 14810, and 14854 (distr. Muñoz), 16170 (distr. Rómulo Gallegos): Terr. Fed. Amazonas: J. A. Steyermark 117130.

This is the first record of the species from Apuré.

- 36a. Strychnos mitscherlichii Richard Schomburgk Reisen 2: 451. 1848, var. mitscherlichii.

Venezuela: Bolívar: Ronald Liesner 5679, 5979. Colombia: Vaupes: Mitú, James L. Zarucchi 1231. Peru: Loreto: Maynas (near Iquitos), Franklin Ayala 1556.

38. Strychnos darienensis Seemann, Bot. Voy. Herald 166. 1854.

Panama: Canal Zone: A. Gentry 3247 (MO). Venezuela: Delta Amacuro: J. A. Steyermark 115349; Terr. Fed. Amazonas, R. L. Liesner 6625. Peru: Loreto: Maynas, Christopher Davidson 5363 (MO), Filomeno Encarnacion C. 974 (MO), Juan Revilla 1891 (MO).

This is the first record of the species from Venezuela.

39. Strychnos guianensis (Aublet) Martius, Syst. Mart. Med. Bras. 121. 1843.

Venezuela: Apuré: Gerrit Davidse 13856, 15020, 15660.

Brazil: Amazonas: Rio Canuma, O. P. Monteiro 1399 (INPA).
 Colombia: Vaupes: Mitu, James L. Zarucchi 2169, 2474. Bolivia:
 Beni: Guayaramerín - Riberalta, William R. Anderson 12015.

These are the first records of the species from Bolivia and from Apure, Venezuela.

40. *Strychnos glabra* Sagot ex Progel in Mart. Fl. Bras. 6 (1): 275. 1868.

French Guiana: Oldeman 2818.

46. *Strychnos hirsuta* Spruce ex Bentham, Jour. Linn. Soc. 1: 106. 1856.

Brazil: Amazonas: C. D. A. Mota s.n. (09/07-1976) (INPA)
 (Nova Prainha), Pe. J. Maria Albuquerque s.n. (03/07-1977)
 (INPA) (Manacapuru).

From the root bark of this species (Prance 22104 - from the basin of Rio Maues, Amazonas, Brazil) two new alkaloids - strychnohirsutine - and tetradehydrostrychnohirsutine were isolated and structural formulas were determined. They are both β -carboline derivatives representing another link between the alkaloids of Loganiaceae and Apocynaceae (3: 295).

For the previous information on the alkaloids in *S. hirsuta* see Lloydia: 35: 240. 1972.

47. *Strychnos cogens* Bentham, Jour. Bot. Hook. 3: 241. 1841.

Venezuela: Bolívar: Ronald Liesner 5396, 5415, 5416, and 5710; Terr. Fed. Amaz. R. Liesner 6203. Bolivia: Beni: Rio Yata, William R. Anderson 11972.

This is the first record of the species from Bolivia.

53. *Strychnos fendleri* Sprague & Sandwith, Kew Bull. 1927: 129. 1927.

Venezuela: Guarico: L. A. Aristeguiata 6435; Sucre: J. A. Steyermark 107848, 108047, 108313 (MO), 108713 (MO).

From the stem bark of this species (Murça Pires 14687, from Roraima, Brazil) - a new alkaloid 11-methoxystrychnofendlerine was isolated and structural formula was determined. From the same plant three known alkaloids were also isolated: diaboline, henningsamine, (O-acetyl)diaboline A and spermostrychnine.

For the previous information on the alkaloid in *S. fendleri*

see Phytologia 36: 316. 1976 and 36: 21. 1977.

55. Strychnos rubiginosa A. DeCandolle in DeCandolle Prodr. 9: 16. 1845.

This species was studied chemically for the first time and a new alkaloid - strychnorubigine was isolated from the root bark and structural formula was determined. Two already known alkaloids, 11-methoxydiaboline and normacusine were also isolated from stem and root bark of the same plant (Harley 19142, from Bahia, Brazil) (3: 293).

56. Strychnos parvifolia A. DeCandolle in DeCandolle Prodr. 9: 16. 1845.

Brazil: Pará: basin of Rio Araguaia, N. T. Silva 4763 (MG); Maranhão: N. A. Rosa 2536 (MG); Bahia: Scott Mori et al 11074, 11129, 11795, and 11806 (all from Maracas), W. R. Anderson 36874.

This is the first record of the species from the basin of Rio Araguaia.

From the bark of roots of this species collected in Bahia, Brazil (S. A. Mori & T. S. dos Santos 11795) akagerine was isolated as the sole tertiary alkaloid present. Several quaternary alkaloids, still under examination, were detected by T. L. C. and paper chromatographic analysis (unpublished manuscript).

For the previous information on the alkaloids in S. parvifolia see Lloydia 35: 248. 1972.

From another sample, also from Bahia, (Mori 11806) different alkaloids were isolated.

- 57a. Strychnos recognita Krukoff & Barneby, Phytologia 27: 103. 1973.

Brazil: Bahia: mun. Uruçuca, Scott Mori 11744.

Two ounces of root bark of this species were sent to Prof. Marini-Bettolo for assay.

According to the private communication from Prof. G. B. Marini-Bettolo (his letter to me of 18/1-1980) from root bark of this species collected in Bahia, Brazil (Scott Mori 11744) very small quantity of tertiary alkaloids were isolated, hardly sufficient for structure determination. This finding is very interesting taxonomically as it confirms our placing sterile

specimens from the basin of Rio Purus with *S. solimoesana* (see under this species) and permit to define the range of these two species more accurately.

59. *Strychnos brasiliensis* (Sprengel) Martius, Flora 24 (Beibl. 2): 84. 1841.

Paraguay: T. M. Pedersen 8614 (MO). Argentina: Corrientes: A. Krapovickas 25785 (F).

Subsectio Eriospermae Krukoff & Barneby, Mem. NY Bot. Gard: 20: 68. 1969.

61. *Strychnos pachycarpa* Ducke, Bol. Tech. Inst. Agron. Norte 3: 15. 1945.

Colombia: Choco: Quibdo-Istmina Road, A. Gentry 23839.

This is the first record of this species from Colombia.

65. *Strychnos mattogrossensis* S. Moore, Trans. Linn. Soc. II. 4: 392. 1895.

Venezuela: Miranda: Cerros del Bachiller, J. A. Steyermark 116300.

69. *Strychnos poeppigii* Progel in Mart. Fl. Bras. 6 (1): 282. 1868.

Peru: Loreto: Maynas, A. Gentry 22147.

70. *Strychnos tarapotensis* Sprague & Sandwith, Kew Bull. 1927: 131. 1927.

Venezuela: Apure: Gerrit Davidse 14481. Brazil: Amazonas: basin of Rio Demeni, G. T. Prance 10368; Acre: basin of Rio Purus, G. T. Prance 12859. Peru: Amazonas: Rio Genipa, Ernesto An-
cuash 1404, A. Kujikat 388; Madre de Dios: Robin B. Foster 6471 (F).

These are the first records of the species from Apure (Venezuela) and Madre de Dios (Peru).

71. *Strychnos schunkei* Krukoff & Barneby Phytologia 25: 53. 1972.

Peru: Loreto: Coronel Portillo, Schunke 9175, Ecuador: Los Rios or Pichincha, C. H. Dodson 7771 (MO).

These are the second and third collection of this species, a new record for Ecuador and the first collection in fruit which are \pm 2.4 cm in diam.

Bibliography

(In order to conserve space, I am citing here only the papers which are not cited in Suppl. VII -XVIII).

1. Krukoff, B. A. Supplementary notes on the American Species of *Strychnos*. XVII. *Phytologia* 41: 201-238. 1979.
2. Krukoff, B. A. Supplementary notes on the American Species of *Strychnos*. XVIII. *Phytologia* 44: 1-10. 1979.
3. Marini-Bettolo, G. B. et al. Strychnorubigine, strychnohirsutine, tetrahydrostrychnohirsutine and 11-methoxyxistofenlerine: new alkaloids of American *Strychnos*. Kendic, della classe di Scienze fisiche, matem. e natur. 65 (fasc. 6): 294-296 Dic. 1978,

List of Exsiccatae

The first list of Exsiccatae covering papers on *Strychnos*, including supplement XI, was published in *Lloydia* 35 (3): 262-270. 1972, the second covering supplements XII, XIII, and XIV in *Phytologia* 33: 319-322. 1976, the third covering Supplements XV and XVI in *Phytologia* 39: 281-282. 1978, the fourth list covering Supplement XVII in *Phytologia* 41: 237-238. 1979, the fifth list covering Supplement XVIII in *Phytologia* 44: 9. 1979. The present list covers Supplement XIX. Only numbered collections and those of which the dates of collection are recorded have been listed. Collections identified with doubt are not listed. If a collector gathered his collection together with others, only his name is cited in this list. Collections with Dr. Prance's numbers are cited under Prance.

Albuquerque, J. Maria, s.n. (03/07-1977) (46)

Alston, A. H. G., 5280 (20a)

Ancuash, Ernesto, 1404 (70)

Anderson, W. R., 11972 (47), 12015 (39), 36874 (56)

Aristeguieta, L., 6435 (53)

Ayala, F., 1556 (36a)

Cedillo, T. R., 205 (13)

Cid, C. A., 103 (6), 499 (6), 777 (31)

Cordeiro, M. R., 1122 (32)

Cuatricasas, J., 17531 (32a)

Davidse, G., 13856 (39), 13962 (35), 14347 (20a), 14435 (35), 14481 (70), 14744 (35), 14810 (35), 14854 (35), 15020 (39), 15660 (39), 15885 (20a), 16170 (35), 16196 (20a)

Davidson, Christopher, 5363 (38)

Diaz, C., 214 (32)

Dodson, C. H., 7771 (71), 8419 (19)

Encardacion C., F., 974 (38)

Forero, E., 1614 (12), 1629 (19), 1666 (19), 1810 (19), 2531 (12), 2659 (12), 2660 (32a), 2702 (19), 2703 (12), 3922 (32(?)), 3924 (32(?)), 4038 (3), 4134 (32(?)), 4458 (12), 4485 (32(?)), 4564 (3), 4640 (12), 4793 (3), 4818 (32(?)), 4828 (32(?)), 5027 (32(?))

Foster, Robin B., 6471 (70)

Garibaldi, C., 234 (12)

Gentry, A., 3247 (38), 18530 (6), 22147 (69), 22191 (24), 23838 (32(?)), 23839 (61)

Grenand, 437 (20)

Iltis, H. H., 1470 (12)

Krapovickas, A., 25785 (59)

Kujikat, A., 388 (70)

Liesner, R., 5396 (47), 5415 (47), 5416 (47), 5679 (36a), 5710 (47), 5979 (36a), 6203 (47), 6625 (38), 7331 (6)

Monteiro, O. P., 1395 (6), 1399 (39)

Mori, S. A., 11074 (56), 11129 (56), 11177 (14), 11654 (15), 11744 (57a), 11795 (56), 11806 (56)

Mota, D. A., s.n. (09/07-1976) (46)

Nascimento, O. C., 833 (6)

Oldeman, R. A. A., 2818 (40)

Pedersen, T. M., 8614 (59)

France, G. T., 10368 (70), P12859 (70)

Revilla, Juan, 1891 (38)

Rosa, N. A., 2536 (56)

Rosario, Carlos S., 60 (26)

Santos, T S. dos, 3444 (5)

Schultea, R. E., 17059 (3)

Schunke V., J., 9175 (71)

Silva, M. G., 4481 (25)

Silva, N. T., 4763 (56)

Steyermark, J. A., 97583 (20a), 107848 (53), 108047 (19), 108313 (53), 108713 (53), 115349 (38), 116562 (31), 116804 (31), 117130 (35)

Zarucchi, J. L., 1231 (36a), 1823 (6), 2169 (39), 2453 (6), 2474 (39)

